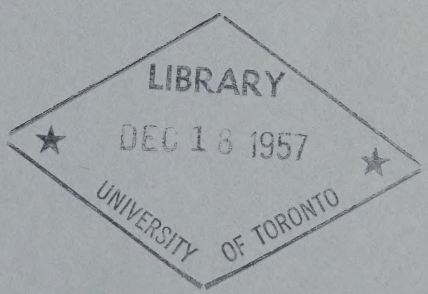
Canada
Department of Mines
and Technical Surveys

Annual **Report of the**

EXPLOSIVES

DIVISION



Calendar Year
1956

Canada
Department of Mines
and Technical Surveys

Report of the

EXPLOSIVES DIVISION

Calendar Year 1956

by
H. P. Kimbell
Chief Inspector

1500-1956

C O N T E N T S

93673—1½

The function of the Explosives Division is to administer the Explosives Act, an Act respecting the manufacture, authorization, sale, storage, and importation of explosives. It also controls transportation by road. The Act exists solely in the interests of public safety.

Offices and Staff

The Explosives Division maintains its main office at 238 Sparks Street, Ottawa, and branch offices at 739 West Hastings Street, Vancouver 1, B.C., and 7 Terminal Road, Halifax, N.S. All applications for factory and magazine licences, certificates for registered premises, and permits to transport and import explosives should be addressed to the Chief Inspector of Explosives, Explosives Division, Department of Mines and Technical Surveys, 238 Sparks Street, Ottawa. The Division's testing laboratory is on the River Road near Uplands Airport, Ottawa.

The Division operated during the year with a deficiency of one inspector. Total staff consisted of the chief inspector, four inspectors, three chemists, and a clerical staff of eleven.

Legislation

The Explosives Regulations were completely revised by Order-in-Council P.C. 1956-349, 1 March 1956, and became effective by publication in the Canada Gazette 14 March 1956. The revisions mainly involved corrections and clarifications but an important change was made in Part VI, dealing with transportation by road and private railway. Section 57 (*o*) now requires that all vehicles, when carrying explosives in excess of 50 lb., must display the word "EXPLOSIVES" in letters 6 inches high. The signs must be visible from front, rear, and both sides of the vehicle, but must not be displayed when no explosives are carried. Formerly, the only warning required for loads up to 4,000 lb. was a red flag but this was also a requirement for other purposes and therefore not completely indicative of explosives. It was felt that every highway user is entitled to know beyond doubt when any vehicle is carrying explosives.

Due to the wide definition of "explosive", it was found necessary to amend Part VI later in the year. By Order-in-Council P.C. 1956-1552, 18 October 1956, Section 57(*o*) was amended to exempt vehicles carrying safety cartridges, safety fuses, and "shop goods" fireworks from the requirement to display "EXPLOSIVES" warning signs. This Order-in-Council also added "Amex" to those explosives which may be carried to the full carrying capacity of a vehicle without an explosives transportation permit.

Table of Safety Distances

Following a meeting of inspectors in February, decision was made to adopt a revised Table of Safety Distances for assessing the safety of locations for explosives factories and magazines when considering applications for licences under the Act. In this the Division has followed the lead of those who administer the Explosives Act of the United Kingdom. The revised Table, which supersedes the 1903 "British Table of Distances",

is based on the known effects of explosions and of enemy bombing in the United Kingdom, together with the results of an extensive series of large scale explosion trials. For some years it has been the official Table used by the Department of National Defence and thus Canadian practice is now consistent in this regard. Copies of the new Table are available from the Chief Inspector, and an abstract has been incorporated into a revised edition of the Division's booklet *The Storage of Explosives.*

Safety Literature

Revised editions of the Division's safety booklets *The Storage of Explosives* and *The Handling of Explosives* were published during the year. These are distributed primarily to magazine licensees but are available to all who apply. Judging from the number of requests for copies it appears that they are serving a very useful purpose.

Manufacture

The number of explosives factories licensed is the same as last year. (*See* Appendix A). The new factory of Dupont Company of Canada, referred to in last year's report, was still under construction and will not be licensed until 1957. Several factories were engaged in expansion during the year necessitating numerous consultations with the Division's staff in connection with licence amendments.

Due to the considerable developments in the mining industry and to extensive construction projects such as the St. Lawrence seaway, production of commercial blasting explosives again showed a sharp increase, rising to 148,080,000 lb. from 130,640,000 lb. in 1955. The figure includes "Nitrone" explosives but does not include trinitrotoluene, nitrocellulose, and nitroguanidine for military purposes, export, or incorporation in commercial explosives. Due to shortage of staff, inspections of licensed factories were curtailed to thirty-five. All manufacturers give the Division excellent cooperation.

Authorization

Before they may be manufactured in, or imported into Canada, all explosives must be declared authorized by the Minister of Mines and Technical Surveys. A complete list of authorized explosives is shown in Appendix D.

The procedure and tests required for authorization are set forth in Part II of the Regulations made under the Act and the Division maintains a laboratory for conducting such tests. To ensure that necessary standards are maintained in regular production following authorization, the laboratory staff also performs tests on "run-of-work" samples taken by inspectors. In addition, they are able to assist other government departments in matters concerning safety with explosives and other dangerous materials.

Samples examined during the year by the laboratory numbered 149 made up as follows:

Commercial Blasting Explosives	
(*a*) for authorization	20
(*b*) run-of-work	24
Detonators	3
Ammunition	17
Fireworks (including Chinese firecrackers)	71
Miscellaneous (including assistance to Police, Dept. of National Defence and Post Office Department)	14
	149

Storage of Explosives

Licences issued in 1956, compared with 1955, were as follows:

	1956	1955
Magazine Licences (storage for sale)	466	466
Registered Premises Certificates (storage of small quantities for sale)	109	108
Temporary Magazine Licences (storage for private use)	978	924

Imports

The explosives imported are listed in Appendix B; they were imported under authority of 1,142 general and 21 annual importation permits. The largest items in the list are:—nitrocellulose for use in manufacture of lacquers, coated fabrics etc., over four million pounds; 'safety cartridges', over eight million rounds; and manufactured fireworks, over one million pounds.

Transportation

The Act controls transportation by road only. Since the Regulations were revised late in 1954, allowing loads up to 10,000 lb. by permit, there has been a very considerable increase in the proportion of explosives transported by truck. Explosives transportation permits issued in 1956 numbered 270 compared with 156 in the previous year.

Explosives Division

Inspection

The following record of inspections includes those carried out by deputy inspectors of explosives of the R.C.M.P., as well as the Division's staff. The assistance of the R.C.M.P. in this work is invaluable.

Factories	35
Magazines (including temporary magazines)	1,775
Registered premises	157
Unlicensed premises (Explosives Regulations Part XIII)	38
Transportation	85

Explosives Regulations Part XIII allows storage of quantities up to 150 lb. dynamite and 2,000 detonators without a licence but specifies safe and secure facilities. The inspections in this category are supplemented by many letters of warning sent to purchasers whose names and addresses are obtained by inspectors from the records required to be kept by vendors.

Destruction of Explosives

The Division is responsible for ensuring the safe disposal of abandoned and deteriorated explosives. In 1956 records were received of the destruction of 21,600 lb. of blasting explosives and 4,160 detonators.

Of these quantities, about 5,300 lb. dynamite and 400 detonators had been abandoned by their owners in 29 instances reported. Most involved small quantities, the owners of which were not discovered. There were two cases of abandonment at mining sites involving 3,700 lb. and 800 lb. respectively.

The main reason for destruction is of course deterioration which results from poor or prolonged storage. Two construction companies had to destroy 3,350 lb. dynamite when their stocks were condemned by inspectors. A mining company in the Northwest Territories was obliged to destroy 9,700 lb. Forcite which had been submerged in water for two hours following an accident in lightering operations.

Two proprietors of "Joke Shops" were found in possession of cigarette loads and explosive matches. They voluntarily surrendered these unauthorized fireworks for destruction. Authorization of all varieties of trick fireworks has consistently been refused since the Act was proclaimed.

Thefts

The importance of security is emphasized by this year's experience with respect to thefts. Twenty-one thefts were recorded, fourteen of them following break-ins of licensed magazines. Total quantities involved were 2,450 lb. dynamite and 5,200 detonators.

Analysis of the theft records shows three instances in which juveniles were involved. They stole detonators when security precautions in storage of small quantities were obviously seriously lacking. In two in-

stances entry was effected through a window. The Regulations require that any number of detonators, however small, must be kept in a "suitable receptacle" securely locked.

There were five instances of theft by teen-aged pranksters or vandals. Prosecution followed in one when 2,000 detonators, stolen from a licensed magazine at a quarry, were left to detonate on top of a stove. In another, after stealing dynamite from a construction site, five teen-agers exploded twenty-five sticks and were prosecuted under the Criminal Code for wilful mischief.

Prosecutions

There were nineteen prosecutions for violation of the Act and Regulations; convictions resulted in eighteen cases and one was dismissed.

Seven of the prosecutions were for violations of the Regulations governing transportation by road. Some of the offences were (*a*) transportation of dynamite and detonators together without prescribed separation, (*b*) exceeding the speed limit of 40 miles per hour, (*c*) failure to display "EXPLOSIVES" warning signs, (*d*) failure to carry a fire extinguisher, and (*e*) smoking while attending a vehicle transporting explosives. One offender was fined a total of $200 on five counts.

Most of the other prosecutions involved violations of the Regulations for safe storage; some examples follow:

A construction company was fined $75 for storing dynamite and detonators together in an unlocked receptacle which did not bear an "EXPLOSIVES" warning sign.

Following the finding of a partially-filled box of dynamite and detonators without any protection or supervision whatever, a construction company was fined $100 and costs.

The discovery of some detonators in the possession of a young boy led to an investigation which disclosed that the doors of two licensed magazines had remained unlocked and unguarded for several days and nights. The licensee was convicted and fined $50 and costs.

A paper company was fined $50 and costs for failure to maintain one of its logging magazines in clean and weatherproof condition.

A contractor was convicted and fined for storing explosives in an unlicensed magazine, and a merchant was penalized for storing and selling small quantities without the required registered premises certificate.

In addition to prosecutions under the Explosives Act, there were court actions under the Criminal Code and municipal bylaws. The following were reported:

An employee of a contractor engaged in sewer excavation within the limits of a city was prosecuted under the Criminal Code when detonators were left unprotected at the job site and were found in possession of a child six years old. City authorities entered prose-

cution under the Criminal Code and a fine of $200 and costs was imposed. The Police Magistrate warned company officials that any further prosecution of this type would result in a jail term without option of a fine. It is significant that some offences under the Explosives Act may also be violations of the Criminal Code. This case was prosecuted under Section 77 which reads as follows: "Every one who has an explosive substance in his possession or under his care or control is under a legal duty to use reasonable care to prevent bodily harm or death to persons or damage to property by that explosive substance". Section 78 provides very severe penalties of imprisonment if an explosion results from someone's culpable failure under Section 77.

A teen-ager was fined $20 for having a homemade bomb in his possession outside a movie theatre.

Two fireworks vendors were fined for contravention of city by-laws regulating sale. The Explosives Act specifies the kinds of fireworks which may be held for sale to the general public by retailers but many cities have passed by-laws which regulate sale in other respects. Some forbid sale to children and restrict the period of time during which fireworks may be sold.

Accidents

An analysis of the total reported accidents with explosives in 1956 is shown in Appendix C, Part I. The following shows the comparison with recent years:—

	Accidents	Killed	Injured
1952	129	45	135
1953	127	29	149
1954	132	15	151
1955	112	22	119
1956	**113**	**19**	**123**

In Manufacture

There were nine accidents with comparative statistics as follows:

1952	11	3	11
1953	9	0	12
1954	24	0	11
1955	25	0	13
1956	**9**	**1**	**9**

None of the 1956 accidents happened in a dynamite factory though production reached a record 74,000 tons. It is a great credit to the industry that there have been no fatalities in dynamite manufacture for ten successive years.

The fatal accident happened in a factory manufacturing small arms ammunition. An operator was manually transporting a wooden carrier containing approximately 2.2 lb. of dry lead styphnate and tetrazene along a wooden walkway when it exploded and he was killed. It was apparent that he fell and the carrier struck the walkway but the cause of the fall was not determined. This type of accident, the first during manual transportation in the lengthy history of this factory, is very difficult to guard against. No firm recommendation was made by the inspector who investigated but the company has a long-range plan which it is hoped will eliminate the manual transportation of explosive in this form.

At the same factory an explosion happened when a serviceman was in the act of picking up a carton of electric detonators for transporting to the casing room. He suffered serious injuries to his left hand and an operator suffered shock and temporary deafness. Static electricity was suspected as the most likely cause but this could not be conclusively proven.

An operator at a shell-filling factory sustained burns to face and hands when a flash occurred during sieving of potassium chlorate. Contamination of the chlorate by traces of fuel-type ingredients on the sieve was the probable cause. Separate sieves must be used for each ingredient.

At the same shell-filling factory an explosion involving a tray of detonator sleeves resulted in the operator sustaining injuries to both hands. Apparently the sensitive lead azide detonated by shock resulting from some action and there was evidence that standing instructions for safe procedure were not followed.

In Use

Seventy-one accidents were reported, comparative statistics being as follows:

	Accidents	Killed	Injured
1952	81	26	84
1953	90	26	82
1954	70	12	72
1955	60	16	67
1956	**71**	**15**	**76**

The Act does not govern the actual using of explosives but there are provincial statutes such as the Mining Acts and Workmen's Compensation Acts which exercise control. Appendix C, Part I, shows an analysis of causes based on reports received from provincial authorities, police reports and other sources. It will be noted that of the seventy-one accidents, forty-nine occurred in mines and quarries, and twenty-two elsewhere, such as construction, logging, land-clearing etc. Proper care would have avoided most of them; this appears obvious from an examination of the Table. The most frequent cause was "drilling into explosives", with "not taking proper cover" a close second.

93673—2½

Explosives Division

The Ontario Highway Construction Safety Association have now published a "Safety Code" which contains valuable precepts in connection with storage, handling, and use of explosives. Canadian Industries Ltd. have just published a series of warning posters which are significantly titled as follows:—

Carefully Wash Down and Examine the Face Before Drilling.
Don't Gamble by Drilling into Bootlegs . . . . They may be Loaded.
Don't Delay! After Spitting a Round Leave at Once.
The Best Protection from Flying Debris is Distance.
Fumes from Blasting Are Dangerous . . . . Proper Ventilation Is Essential.
Guard Every Possible Approach to a Blast!

In Conveyance

Only two incidents were reported but fortunately there were no serious effects.

A vehicle licensed to carry 10,000 lb. explosives was rammed from the rear after stopping when an army vehicle was crossways on the highway. The explosives vehicle was damaged but there were no injuries and the explosives were not affected.

Sticks of dynamite were lost through an opening in the floor of a vehicle which was obviously not in proper repair. The explosive was recovered but not before five sticks had been picked up by school children.

Misuse

The *misuse* of explosives resulted in twenty-six accidents, the five-year record being as follows:—

	Accidents	Killed	Injured
1952	24	6	32
1953	21	1	49
1954	31	1	47
1955	20	1	37
1956	**26**	**0**	**34**

All these accidents, as well as those classified under the heading "Miscellaneous", are briefly described in Appendix C, Part II. A review of Part II indicates, as usual, that many of these accidents could have been avoided if the security Regulations had been carefully observed by those in possession of explosives.

Carelessness and thoughtlessness in handling detonators is the chief cause of the misuse accident toll. Contractors and powdermen have a serious responsibility in this regard and they should remember that every single one of these small explosive devices is a potential crippler of children. Youngsters are always trespassing at the sites of construction work and if they find a detonator, tragedy usually follows. Casual users are also often to blame because of failure to safeguard a few surplus detonators. Casual users are advised never to keep small surplus quantities but to return them to the supplier or destroy them. Many accidents happen to children who find detonators that have been cached away many years previously and forgotten.

There were three accidents caused by home-made explosives, one with serious crippling effects. Many budding teen-aged chemists and inventors desire to make an explosive and subsequently a bomb of some sort. The best hope of accident prevention lies in parental supervision and in warnings by teachers of chemistry. Following publication of last year's report containing special remarks about this type of accident, copies were sent to all provincial Departments of Education. Most Departments agreed to circulate a warning to high schools with the aid of a pamphlet prepared by the Division entitled "Home-made Explosives are Dangerous".

APPENDICES

APPENDIX A

Factories Licensed to Manufacture Explosives, 1956

Owner	Location of factory	General nature of product
Canadian Industries Ltd.	Beloeil, Quebec	Blasting explosives, black powders, nitro-compounds.
Canadian Industries Ltd.	James Island, B.C.	Blasting explosives.
Canadian Industries Ltd.	Nobel, Ont.	Blasting explosives.
Canadian Industries Ltd.	Brainerd, Man.	Blasting explosives.
Canadian Industries Ltd.	Brownsburg, P.Q.	Ammunition, detonators, fusees, etc.
Canadian Industries Ltd.	Seven Islands, P.Q.	Blasting explosives.
Canadian Industries Ltd.	Calgary, Alta.	Blasting explosives.
Canadian Safety Fuse Co. Ltd.	Brownsburg, P.Q.	Safety fuse, detonating fuse, fuse lighters, etc.
*Canadian Arsenals Ltd.	Beloeil, P.Q.	Time ring fuse powder.
Canadian Arsenals Ltd.	St. Paul l'Ermite, P.Q.	Filling military shells, fuses, etc.
Canadian Arsenals Ltd.	Valcartier, P.Q	Filling military small arms ammunition
Canadian Arsenals Ltd	Valleyfield, P Q	Military explosives, propellants
North American Cyanamid Ltd	Niagara Falls, Ont	Nitroguanidine
T W Hand Fireworks Co Ltd	Cooksville, Ont	Fireworks and military pyrotechnics
T W Hand Fireworks Co Ltd	Papineauville, P Q	Fireworks and military pyrotechnics
Croname (Canada) Ltd	Waterloo, P Q	Toy pistol caps
Montreal Fireworks Displays and Manufacturing Company	Ville la Salle, P Q	Display fireworks
W F Bishop & Son Ltd	Unionville, Ont.	Fireworks.
Superior Toy Ltd.	Dundas, Ont.	Toy pistol caps.

* Inactive.

APPENDIX B

Explosives Imported into Canada

Class	Division	Description	Quantity
I	.....	Gunpowder	80,575 lb.
II	.....	Nitrate Mixtures	103,390 lb.
III	.....	Nitro-Compounds:—	
	1	Nitroglycerine Explosives	15,546 lb.
	2	(*a*) Propellants	21,914 lb.
		(*b*) For use in explosives factories	714,630 lb.
		(*c*) For other manufacturing purposes	4,136,105 lb.
V	1	Fulminates	800 lb.
VI	1	Primers	104,600
	1	Safety Cartridges	8,275,218 rounds
	1	Safety Fuse	22,989 feet
	2	Detonating Fuse	314,810 feet
	2	Seismic Explosives	112,096 lb.
	3	Detonators	161,142
	.....	Miscellaneous	28,040 lb.
VII	2	Manufactured Fireworks	1,222,411 lb.

APPENDIX C

Part I

Accidents Involving Explosives During the Calendar Year 1956

Circumstances or Cause	Mines and Quarries			Elsewhere			Total		
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Killed	Injured
In Use.									
a Delaying too long in lighting fuse	3	.....	6	.....	.....	.....	3	.....	6
b Premature firing of electrical blasts	1	1	2	.....	.....	.....	1	1	2
c Not taking proper cover	9	3	7	7	1	6	16	4	13
d Projected debris	5	.....	5	3	2	1	8	2	6
e Returning too soon after blasting	1	.....	2	4	2	2	5	2	4
f Improper handling of misfires	1	.....	1	1	.....	1	2	.....	2
g Rough tamping	1	.....	2	1	.....	1	2	.....	3
h Ignition of explosives by flames, sparks, etc.	1	1	1	.....	.....	.....	1	1	1
i Drilling into explosives	13	.....	18	1	.....	1	14	.....	19
j Striking unexploded charge in removing debris	.....	.....	.....	.....	.....	.....	.....	.....	.....
k Preparing charges	6	1	8	2	1	2	8	2	10
l Using too short a fuse	.....	.....	.....	.....	.....	.....	.....	.....	.....
m Insufficient ventilation after blasting	5	1	4	.....	.....	.....	5	1	4
n Springing shots	.....	.....	.....	.....	.....	.....	.....	.....	.....
o Inadequate guarding	3	.....	3	.....	.....	.....	3	.....	3
p Various	.....	.....	.....	3	2	3	3	2	3
Total	49	7	59	22	8	17	71*	15	76
In manufacturing	.....	.....	.....	.....	.....	.....	9	1	9
In keeping	.....	.....	.....	.....	.....	.....	.....	.....	.....
In conveyance (by road)	.....	.....	.....	.....	.....	.....	2	.....	.....
Total	.....	.....	.....	.....	.....	.....	11	1	9
In Misuse									
(*a*) Detonators	.....	.....	.....	.....	.....	.....	15	.....	22
(*b*) Home-made explosives	.....	.....	.....	.....	.....	.....	3	.....	3
(*c*) Fireworks	.....	.....	.....	.....	.....	.....	5	.....	6
(*d*) Gunpowder	.....	.....	.....	.....	.....	.....	3	.....	3
Total	.....	.....	.....	.....	.....	.....	26†	.....	34
Miscellaneous	.....	.....	.....	.....	.....	.....	5†	3	4
Total all circumstances	49	7	59	22	8	17	113	19	123

* These accidents occurred in circumstances not directly controlled by the Act.

† Circumstances are given on the following pages.

APPENDIX C
Part II
Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
(*a*) *Detonators*			
38	A 12-year-old boy suffered the loss of the thumb and a finger of his left hand and received painful facial injuries when he applied a match to a detonator causing it to explode. He had taken it from a garage at his grandfather's home	.....	1
55	Three teen-age boys found 31 detonators. One boy lit a firecracker and threw it into the pile of caps resulting in explosion of seven of them. Three of the boys sustained minor injuries to the legs and arms	.....	3
62	A juvenile applied a lighted match to a detonator and the resulting explosion severed parts of the thumb and 2 fingers of his left hand and injured his right eye. The detonators, 89 in number, were found in an old bunkhouse formerly used by a construction company	.....	1
71	Five teen-agers were injured, two severely, after exploding a dynamite cap, with a battery, in a snack bar	.....	5
104	Four juveniles found 40 detonators which had been buried in the ground. One boy injured three fingers of his right hand when he lit one with a match and it exploded. The person responsible for burying the detonators was prosecuted and fined for failure to keep explosives under the security required by the Regulations	.....	1
145	A youth was slightly injured when he attempted to burn some blasting caps and detonating relays stolen from a railway car	.....	1
149	A juvenile had 3 fingers of his left hand blown off when he applied a match to a detonator which exploded. He was not aware of its explosive nature	.....	1
152	Three boys stole some fused detonators from an unlocked box in a quarry and attempted to ignite them. One boy lost three fingers	.....	1
162	A youth suffered serious injury to his right hand when he was attempting to remove a detonator placed on the twig of a tree and it exploded	.....	1
173	A detonator thrown into a fire caused injuries to a 5-year-old boy who was standing near	.....	1
174	A man found a detonator in the cupboard of a house where he had recently moved and while examining it, it exploded causing extensive injuries to his left hand. The detonator had apparently been in the cupboard for many years	.....	1

APPENDIX C—Continued

Part II

Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
(*a*) ***Detonators***—Concluded			
181	Two 10-year-old boys were injured when a blasting cap found on an abandoned farm exploded when one of the boys set a match to it	.....	2
189	Twelve juveniles broke into a quarry magazine and stole detonators. One of the boys was slightly injured when he struck one of the detonators on a rock	.....	1
197	A man lost the sight of one eye and partial sight of the other eye as he knelt down to light a fuse in an attempt to destroy a number of abandoned detonators. As he struck a match on a stone the detonators blew up in his face before the fuse was lit. It is believed a spark from the match set off the detonators	.....	1
218	A man was injured as he apparently lit a short piece of fuse and while holding it in his right hand along with 3 detonators, forgot that the fuse was burning. The fuse must have spit through into one of the detonators causing the explosion	.....	1
(*b*) ***Home-Made Explosives***			
115	A teen-ager had both hands badly mutilated when a mixture he and his pal made up from a chemistry set exploded in a plastic tube he was holding in his hands. He was also severely burned about the abdomen. It is believed he was striking the plastic container against a rock when it exploded	.....	1
179	A home-made bomb blasted a locker in a high school; one boy was temporarily deafened	.....	1
232	A youth sustained hand lacerations when a home-made bomb exploded as he prepared to throw it after lighting the fuse. He apparently filled the shell of a bomb-shaped cigarette lighter with gunpowder extracted from rifle bullets	.....	1
(*c*) ***Fireworks***			
39	A juvenile received severe burns to his face and right hand when a single firecracker touched off a violent explosion. The blast was caused when a group of boys playing in a wrecking yard tossed a firecracker into the body of an old truck. It ignited fumes in the gasoline tank	.....	1
40	A lady was slightly injured when she picked up a live firecracker, not realizing the fuse was burning. It was hurled on her front porch by a 12-year-old prankster	.....	1

APPENDIX C—Concluded

Part II

Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
	(*c*) ***Fireworks***—Concluded		
87	A man suffered facial burns and eye injury when attempting to set off a firework which was in damaged condition. After dropping a lighted match into the firework, he bent down to observe if the match had gone out when the firework ignited	.....	1
108	Two youths who dropped lighted firecrackers into a manhole required hospital care for burns about the face and eyes. Fortunately the boys were not hit when the manhole cover blew off. Apparently sewer gas was ignited	.....	2
113	A juvenile suffered burns when a string of firecrackers exploded in his pocket	.....	1
	(*d*) ***Gunpowder***		
154	A boy applied a match to a bottle filled with gunpowder. It exploded in his face causing injuries to his eyes	.....	1
182	Two boys found a jar of gunpowder in an empty barn. They tried to ignite it and it exploded causing serious burns to one of the boys	.....	1
187	Three boys removed gunpowder from shot shells they found in a field. When they held a lighted match to the powder it exploded causing burns to face and neck of one of the boys	.....	1
	Miscellaneous		
83	A juvenile was seriously injured when the object he picked up exploded. It was believed to be an army grenade	.....	1
106	One civilian was killed and two others were injured when an Army bazooka exploded at a military display	1	2
158	A labourer sustained eye and facial injury while carrying out normal sod-cutting duties. The equipment used caused the explosion of a live grenade buried below the surface of the ground	.....	1
82 and 112	Two cases of suicide by means of commercial explosives were reported	2	

APPENDIX D

Authorized Explosives

Canadian Industries Limited (Explosives Division)

AMEX
Ammonia Dynamite—20, 25, 30, 35, 40, 50 and 60 per cent.
Ammonia Dynamite 55 per cent (for export only).
Ammonia Dynamite Extra 20, 70 per cent (for export only).
Ammonia Dynamite quarrying—60 per cent.
Ammonia Gelatin 30, 35, 40, 50, 60, 75, 80, 90 per cent (for export only).
Black Blasting Powder.
Black Sporting Powder.
Blastol—60 per cent.
BRX-7—75 per cent.
BRX-7 (D.N.T.)—75 per cent.
Cilgel—50 per cent.
Cilgel—(D.N.T. or T.N.T.)—50 per cent.
C.I.L. Dynamite Nos. 2, 3, 4 and 5.
Cordite—MD, MDT, W, WT, WM, WMT.
C-X-L Dynamite—Nos. 1 and 5.
C-X-L Gelatin—Nos. 1 and 2.
C-X-L-ite.
Di-Drill Gelatin—60 per cent.
Ditching Dynamite—50 per cent.
Ditching Dynamite—(D.N.T.)—50 per cent.
Driftite—70 per cent.
Driftite (D.N.T. or T.N.T.)—70 per cent.
Dygel—75 per cent.
Dynamex (Diameters 1″ to 1½″ incl.) 40, 50, 60 and 70 per cent.
Dynamex (Diameters 1¾″ and over) 40, 50, 60 and 70 per cent.
EXEL-G—75%.
EXEL-S—75%.
Explosives BL-100—60 per cent.
BL-103
BL-106
BL-111
BL-114
BL-115
BL-116
BL-117
Forcite—30, 35, 40, 40 (Asbestos Corporation),
50, 60, 75, 75 (bagged), 80 and 90 per cent.
Forcite—(Brainerd Series)—30, 40, 50, 60 and 75 per cent.
Forcite—(D.N.T. or T.N.T. Series)—30, 35, 40, 40 (Asbestos Corp.),
50, 60, 75, 75 (bagged),
80 and 90 per cent.
Free Running Ammonia Dynamite—65 per cent.
Fuse Powders—30, 40, 44, 53, 57 and 65 seconds.
Gelatin Dough—90 per cent.
Gelatinized Dynamite—60, 75 per cent (for export only).
Geogel
Gelignite—62 per cent.
Giant Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent.
Giant Gelatin (Brainerd Series)—40 and 60 per cent.
Giant Gelatin (D.N.T. or T.N.T. Series)—20, 25, 30, 35, 40, 50, 60, 75,
80 and 90 per cent.

Authorized Explosives—Continued

Canadian Industries Limited (*Explosives Division*)—Concluded

Guhr Dynamite.
Guncotton.
Gunpowder.
Gypsumite "A", "B", and "C".
Hi-Velocity gelatin—60 and 80 per cent.
Liquid Nitroglycerine.
Lump-Kol Pellet Powder.
Monobel, Nos. 4, 6, 7, 10, 11 and 14.
Monobel, sheathed—Nos. 4, 7 and 10.
Monobel, X(EQ.S.).
Nitrocotton.
Nitrone T-4.
Nitrone T-1 (3 formulae).
Nitrone S-1.
Nitrone S-1 Primer.
Nitrone Primer.
Nitrone T-3.
Nitropel.
Nitrox.
Pellet Powder No. 2.
Polar Stumping Powder—20 per cent.
Signal Bombs.
Semi-Gelatin No. 1.
S.N.G.
"Special No. 1" Dynamite.
Special Gelatin, 60, 75, 80, 90 per cent, (for export only).
Stopeite, 20, 25, 30, 35, 40, 50, 55 and 60 per cent.
Straight Dynamite—20, 25, 30, 35, 40, 50, 60 per cent, (for export only).
Straight Gelatin—25, 30, 35, 40, 50, 60, 75, 80 per cent, (for export only).
Submagel—60, 75 and 95 per cent.
Trinitrotoluene.
Vibrex—60 per cent.

Canadian Safety Fuse Co. Ltd.

"B-Line" detonating fuse.
Safety fuse—"Beaver" Brand.
Safety fuse—"Black Clover" Brand.
Safety fuse—"Black Pacific" Brand.
Safety fuse—"Clover" Brand.
Safety fuse—"Crown" Brand.
Safety fuse—"Moose" Brand.
Safety fuse—"Pacific" Brand.
Safety fuse—"White Jacket" Brand.
Safety fuse—"Yellow Jacket" Brand.
Hot Wire Fuse Lighters.
Igniter Cord—"Thermalite" Brand. Types A and B.
"Primacord" Detonating Fuse.

Canadian Industries Limited (*Ammunition Division*)

Ammunition.
Detonators.
Dextrinated Lead Azide.
Fuse Igniting and Connecting device.

Authorized Explosives—Continued

Canadian Industries Limited (Ammunition Division)—Concluded

"Lead Salt".
Gasloss Delay Electric Blasting Cap, X-107.
Lead Styphnate (Normal).
Millisecond Detonating Relay.
Percussion Caps.
Railway Fusees.
Railway Torpedoes.
Safe-T-Lite Highway Fusee.
Styphnic Acid.
Tetrazene.
Igniter Cord Electric Starter.

North American Cyanamid Ltd., Niagara Falls, Ontario.

Nitroguanidine.

Authorized explosives manufactured by other than Canadian firms:—

Aerojet Engineering Corporation, Azusa, Calif.

Aeroplex AK14 Propellant.

Aktiebolaget Bofors, Nobelkrut, Bofors, Sweden.

Smokeless Sporting Powder.
Detonating Fuse, (Bofors type).

American Cyanamid Co., Latrobe, Pa.

Fulminate of Mercury.
Detonators.

Atlas Diesel Co. Stockholm, Sweden.

Engine Starting Cartridges (including Ignition Papers and Caps).

Atlas Powder Co., Wilmington, Del.

Shaped Charges
Detonators (Blasting Caps)

Austin Powder Co., Cleveland, Ohio.

Black Pellet Powder.

Leon Beaux and Co., Societa Italiana Munizioni, Milano, Italy.

Small arms ammunition.

Bermite Powder Co. Saugus, Calif.

Baker Power Charge No. 661.
Firing Head Igniter—Product No. 660.

Cardox Corporation, Chicago, Ill.

Cardox.
Cardox Heaters.

Authorized Explosives—Continued

Cartoucherie Française, Paris, France.

.22 Blank Cartridges.

Central Railway Signal Company, Boston, Mass.

Railway Torpedoes.

De Kruithoorn N.V. Nederlandsche Jachtpatroonfabriek, 'sHertogenbosch, Holland.

Shotgun Shells 12, 16, 20 gauge.

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.

Auxiliary Charges C. 63.
Detonators.
DuPont Bulk Powder.
DuPont Pistol Powder No. 6.
Explosive Rivets.
Fulminate of Mercury.
F.N.H. Ground Smokeless Powder.
High Temperature E.B. Caps, No. 6.
Improved Military Rifle Powders.
Jet Tappers.
Oil Well Explosives S.O.W.E. No. 1 and EL-431-A.
"Nitramex" No. 2.
"Nitramon S".
"Nitramon S" Primers.
Nitrocellulose.
Nitrostarch.
Open hole Shaped Charges (R.D.X. or Pentolite).
P. 6 Seismograph Booster.
"Pelletol" Nos. 1 and 2.
Perforating Shaped Charges (R.D.X. or Pentolite).
P.E.T.N.
"Primacord" Booster.
Pyro (ground smokeless) Powder.
Smokeless Powders.
Sporting Rifle Powders.
Tetryl.
Waterproof Boosters C. 66.

Dynamit-Actien-Gesellschaft, Nurnberg 2, Germany.

RWS—Flobert Blank Cartridges.
No. 6 Detonators (copper case).
No. 7 Detonators (copper case).
No. 8 Detonators (copper case).
No. 6 Detonators (aluminum case).
No. 7 Detonators (aluminum case).
No. 8 Detonators (aluminum case).
Delay Electric Detonators, 0-10, No. 8 (copper case).
Delay Electric Detonators, 0-10, No. 8 (aluminum case).
Millisecond Delay Electric Detonators, 0-10, No. 8 (copper case).
Millisecond Delay Electric Detonators, 0-10, No. 8 (aluminum case).
Detonating Fuse "Nobel Cord".
R.W.S. Rimfire Cartridges.

Authorized Explosives—Continued

Ellefsens Tendskruefabrikk, Stokke, Norway.

Time Fuses and Detonators for Whaling Guns.

Ensign Bickford Company, Simsbury, Conn.

Ignitacord.
"Primacord-Bickford" Fuse.

ETS. Brandt, La Ferte St. Aubin, (Loiret), France.

Shaped Charges $3\frac{3}{8}$" & 5".

ETS. Billant, Usine Du Prado, Bourges 9, (Cher), France.

Shaped Charges $3\frac{3}{8}$".

Federal Cartridge Corporation, Minneapolis 2, Minn.

Shotgun Cartridges.

Federal Laboratories, Pittsburgh, Pa.

Lachrymatory Cartridges.
Powder Loads.

Gevelot, S.A., 50 Rue Ampere, Paris 17, France.

Shotgun Cartridges.

Giullio Fiocchi, Lecco, Italy.

Power Tool Cartridges, Q 4.
Metallic Cartridges, Cal. 9 mm. short and 7.63 mm Mauser.
Shotgun Cartridges, 12 gauge and 24 gauge.
Shot Shell Primers and Percussion Caps.

Charles Hellis & Sons Ltd., London, England.

12 gauge Shotgun Shells.

Hercules Powder Company, Wilmington, Del.

Detonators.
Gelatin Oil Well Explosives.
Nitrocellulose.
Smokeless Powders.
Vibro Caps.
Vibrogel B and 3.

Hull Cartridge Co., Hull, Yorkshire, England.

Shotgun Cartridges, 12 gauge.

Illinois Powder Manufacturing Co., St Louis, Mo.

"Western Spiral-Pack" Electric Detonators.
Gold Medal Oil Well Explosive 100%.

Authorized Explosives—Continued

Imperial Chemical Industries Limited, England.

Cerium Low Tension Fuseheads.
Detonating Relays.
Percussion Caps.
Black Sporting Powders FG, FFG, FFFG and NFFFG.
Fireworks Powders, Cannon, Meal.
Black Whaling Powder.
Saluting Powder.
Gunpowder G-7, G-12, G-20.
Gunpowder SFG-12, SFG-20, Sulphurless mealed.
Smokeless Whaling Charges.
Tetryl.
Detonators.
Pentaerythritol Tetranitrate (P.E.T.N.)
Safety Cartridges.
Smokeless Powder.

Jet Guns Company, Neil P. Anderson Bldg., Fort Worth, Texas.

Glass Gun Perforating Charges, GG2, GG4, GG7.
Shaped Charges, 1¾", 2 3/16".

Kemode Manufacturing Co. Inc., New York City, N.Y.

"Quik-Shot" Cartridges.

Kilgore Incorporated, Westerville, Ohio.

Flashlight Cartridges.

King Powder Co., Cincinnati, Ohio.

Black Pellet Powder.

Lake Erie Chemical Co., Cleveland, Ohio.

Lachrymatory Cartridges.

Lane-Wells Co., Los Angeles, Calif.

Gun Perforator Cartridges.

Mid Continent Torpedo Co. Ltd., Tulsa, Okla.

Red Head Firing Heads.

A. B. Norma Projektilfabrik, Amotfors, Sweden.

Safety Cartridges.

Olin Mathieson Chemical Corp., New Haven 4, Conn.

Cyclonite.
"Western" Small Arms Ammunition.
"Winchester" Small Arms Ammunition.
Normal Lead Styphnate.

Pacific Railway Signal Co., Peru, Indiana.

Railway Torpedoes.

Authorized Explosives—Concluded

T. Page-Wood Limited, Bristol, England.

Safety Cartridges.

Patronenfabrik, A. C., Solothurn, Switzerland.

Safety Cartridges 7.5 mm.

Perforating Guns Atlas Corporation, Houston, Texas.

Jet Perforating Charges.

Poudreries Nationales, France.

D-2 Propellant Powder.

Pringle Powder Company, Bradford, Pa.

Liquid Nitroglycerine.

Remington Arms Co. Inc., Bridgeport 2, Conn.

Stud Driver Cartridges.
"Remington" Small Arms Ammunition.
"Peters" Small Arms Ammunition.
"Springfield" Small Arms Ammunition.

F. J. Roberts Squib Company, Punxsutawney, Pa.

Miners' Safety Squibs.

Rohm-Gesellschaft, Sontheim/Brenz, Kreis Heidenheim, Germany.

6 mm. Blank Cartridges.
RG-3 Signal Cartridges.

Shaped Charge Explosive Manufacturers, Inc., Martinsburg, W. Va.

Plurajet Blasting Units (Not for underground use).

Standard Railway Fusee Corporation, Boonton, N.J.

Railway Torpedoes.

Trojan Powder Company, Allentown, Pa.

Nitrostarch.

Western Cartridge Company, East Alton, Ill.

Detonators.
Kiln Gun Shells.
Western Ball Powder.

Winchester Arms Company, Cleveland, Ohio.

"Tempotool" Cartridges.

Authorized Manufactured Fireworks

Fireworks Manufactured by the following Canadian makers are authorized:

W. F. Bishop & Son Limited, Toronto, Ont.
Canadian Industries Limited, Montreal, Que.
Canadian Safety Fuse Company Limited, Brownsburg, Que.
Croname (Canada) Ltd., Waterloo, Que.
Dominion Fireworks Co. Ltd., Dixie, Ont.
T. W. Hand Fireworks Co. Ltd., Cooksville, Ont. and Papineauville, Que.
Montreal Fireworks Displays and Manufacturing Company, Ville St. Pierre, Que.
Superior Toy Limited, Dundas, Ont.

Certain fireworks manufactured outside of Canada by the following makers are authorized.*

Acme Fireworks Corporation (Acme Novelty Manufacturing Company) River Grove, Ill.
Aerial Products Incorporated, Merrick, Long Island, N.Y.
American Railway Signal Company, Fostoria, Ohio.
Anthes Force Oiler Company, Fort Madison, Iowa.
Astra Fireworks Ltd., London, England.
Atlas Fireworks Co. Inc., Los Angeles 22, Calif.
M. Backes' Sons Inc., Wallingford, Conn.
J. G. W. Berchkholtz, Hamburg-Bahrenfeld, Germany.
Hermann Bischoff, Bremen, Germany.
Oswald Bradley Ltd., Southport, Lancs., England.
C. T. Brock & Co., Hemel Hempstead, Herts, England.
Brookside Pyrotechnic & Chemical Co., Elkton, Md.
EM-GE Sportgerate K-G Gerstenberger & Co., Wurttemberg, Germany.
J. Halpern Co., Pittsburgh, Pa., Distributors for Lenover Corporation, Chester, Pa., and Lenover, Pa.
Thos. Hammond & Company, Craigmillar, Edinburgh, Scotland.
Hitt Fireworks Company Limited, Seattle, Wash.
Hudson Fireworks Display Company, Hudson, Ohio.
Interstate Fireworks Manufacturing and Display Company, Bridgewater, Mass.
Japan Fireworks Trading Company Ltd., Tokyo, Japan.
Jatina Manufacturing Co. Inc., Mount Vernon, N.Y.
Keystone Fireworks Manufacturing Co., Inc., Dunbar, Pa.
Kilgore Manufacturing Company, Westerville, Ohio.
Lakeside Railway Fusee Company, South Beloit, Ill.
Lenover Corporation, Chester, Pa., and Lenover, Pa., J. Halpern, Pittsburgh, Pa., Distributors.
Olin Mathieson Chemical Corpn., New Haven, Conn.
Oscar Lunig, Stuttgart-Mohringen, Germany.
Marutamaya Ogatsu Fireworks Co., Tokyo, Japan.

---

* A list of authorized fireworks is on file in the office of the Explosives Division. Information may be obtained on request.

Authorized Manufactured Fireworks—Concluded

C. Schauer Nachfolger, Berlin, Germany.
National Fireworks Incorporated, West Hanover, Mass.
New Jersey Fireworks Mfg. Co. Inc., Elkton, Md.
N.V. Pyro, Klazienaveen, Holland.
Pyrotechnischen Fabriken, Wuppertal-Ronadorf, Germany.
Pyrowerk, Hamburg-Neugraben, Germany.
Reliance Snap Company, Bishop's Stortford, Herts, England.
Richard Appel's Jo King, New York 12, N.Y.
Saburo Inagaki, Ikazaki City, Japan.
Saburo Ishibashi, Tokyo, Japan.
Schermuly Pistol Rocket Apparatus Ltd., Newdigate, Surrey, England.
Standard Fireworks Limited, Huddersfield, England.
Standard Railway Fusee Corporation, Boonton, N.J.
Stehling and Co., Hamburg 11, Germany.
The J. & E. Stevens Sales Co., New York City, N.Y.
Superior Signal Co., Incorporated, South River, N.J.
United Fireworks Manufacturing Company, Dayton, Ohio.
U.S. Fish and Wildlife Service, Pocatello, Idaho.
Van Karner Chemical Arms Corporation, New York City, N.Y.
Joseph Wells & Son Limited, Dartford, Kent, England.
Joh. Chr. Wendt, Hamburg, Gr. Borstel, Germany.
Wunderkerzen-Werk Carl Flemming, Hamburg-Neugraben, Germany.
Yuji Node, Shimozuma-Machi, Makabe-Gun Ibaragi-Prefecture, Japan.

Chinese Firecrackers with gunpowder composition and not exceeding 4″ in length and $\frac{9}{16}$″ in diameter, and small Chinese Fireworks, are authorized when found to function satisfactorily on examination at port of entry.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1957